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ABSTRACT

This paper offers technical information on implementing external video capability on the Apple Macintosh Computer, which has no simple provisions for implementing this type of capability because it uses a non-standard horizontal line rate of 22.35KHz and lacks protection against the emission of RFI (radio frequency interference). The information provided includes a step-by-step guide to video board installation; a section on modifying the power supply to the logic board cable; a video board parts list; a video composite board schematic; and a video board component pictorial. The addresses of two firms that will modify a standard Macintosh and their fees are also provided. (THC)

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External Video For The Macintosh

Drexel University

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External Video
For The Macintosh

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December, 1984

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External Video for the Macintosh

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- Drexel University will not take responsibility for damage caused by implementing the enclosed data.

- YOU WILL BE BREAKING existing FCC regulations concerning RFI emission standards for personal computers.

The Macintosh Computer has no simple provisions for implementing external video capability. Reasons for the lack of external video capability include the use of a non-standard horizontal line rate of 22.35KHz and the lack of protection against RFI emission from the Macintosh. The American television broadcast system uses a horizontal line rate of 15.75KHz. Improved picture resolution is one important result of the Macintosh's higher line rate.

A typical composite video signal contains all the information needed to display a video picture: black/white video, blanking signals, and synchronizing information. The horizontal, vertical, and video components are separate signals generated by the Macintosh. The external video output board uses two dual retriggerable monostable multivibrators for timing the horizontal and vertical signals. A two-input positive NOR gate combines the timed horizontal and vertical signals with the non-composite video from the Macintosh resulting in a 75Ω composite video signal.

Commercially available universal monochrome interfaces are now available. For a fee these firms will modify a standard Macintosh with external video capability. Two such firms are listed below:

VIDCO, Inc.
c/o James P. Hoy
General Manager
1-602-966-2221
CVID 150, list price $350.

Mentaur Technologies
100 Mecey Lane, Suite 203
San Marcos, TX 78666
1-512-396-1565
Mentaur C.V.A., list price $259.

VIDEO BOARD INSTALLATION

1- Remove Mac case.

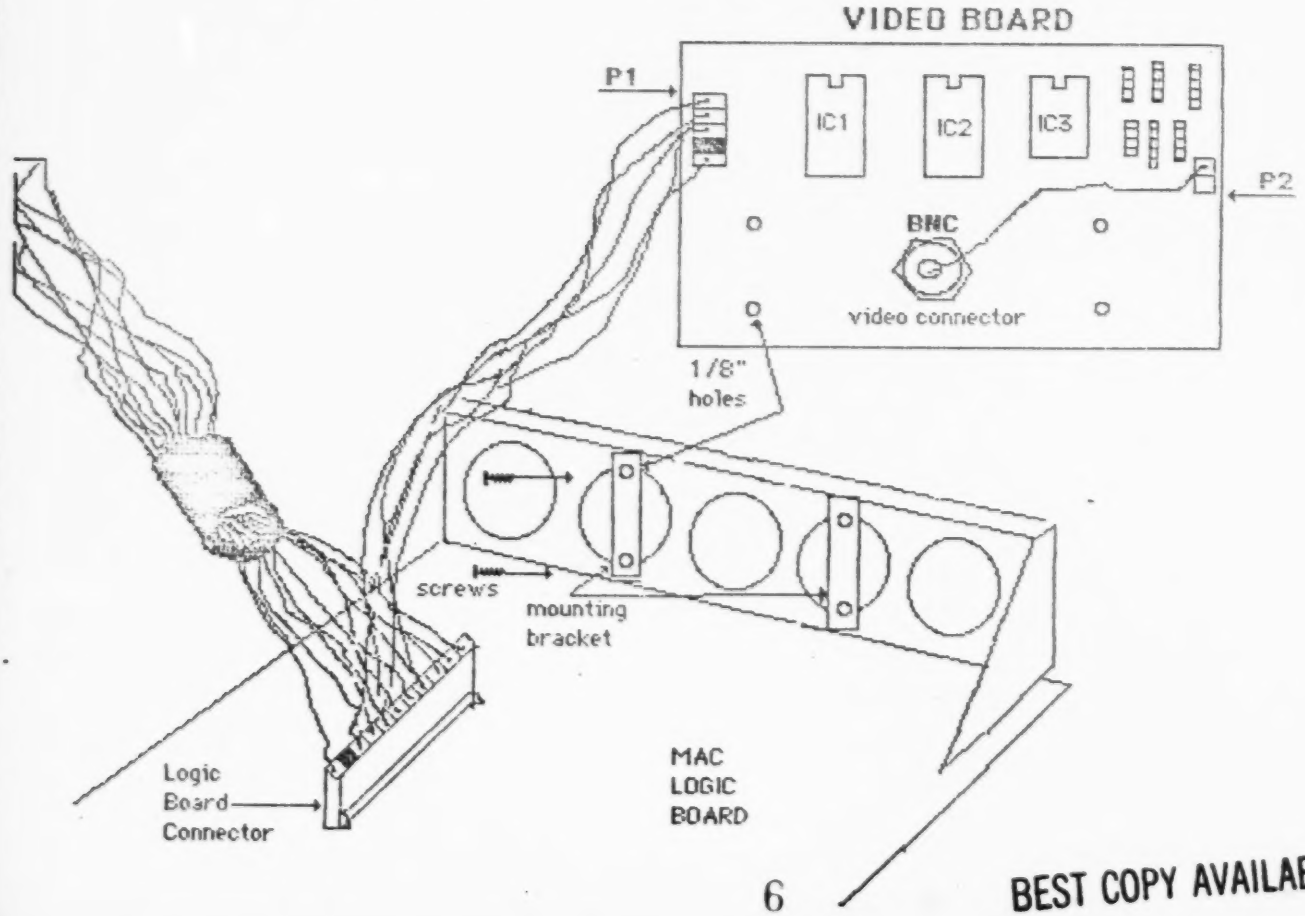
2- Four mounting screws and two brackets are used to secure the video board against the rear part of the metal frame of the Macintosh. The video board components face the front of Mac.

3- Disconnect connector P2 and thread it through the center hole in the metal frame. After mounting the video board to the Mac, reconnect connector P2.

4- Remove the power supply to logic cable from the Mac. Solder the P1 video board connector wires to the logic board side of the removed power supply to logic board cable(see page titled "Modifying the Power Supply to Logic Board Cable").

5- Reconnect the power supply to logic board cable with the added connector (P1) to the video board.

6- The video connector(BNC) needs a 3/4" access hole drilled in the rear of the plastic case. Be very careful in drilling this hole so the BNC connector fits properly. Remount the Mac case.



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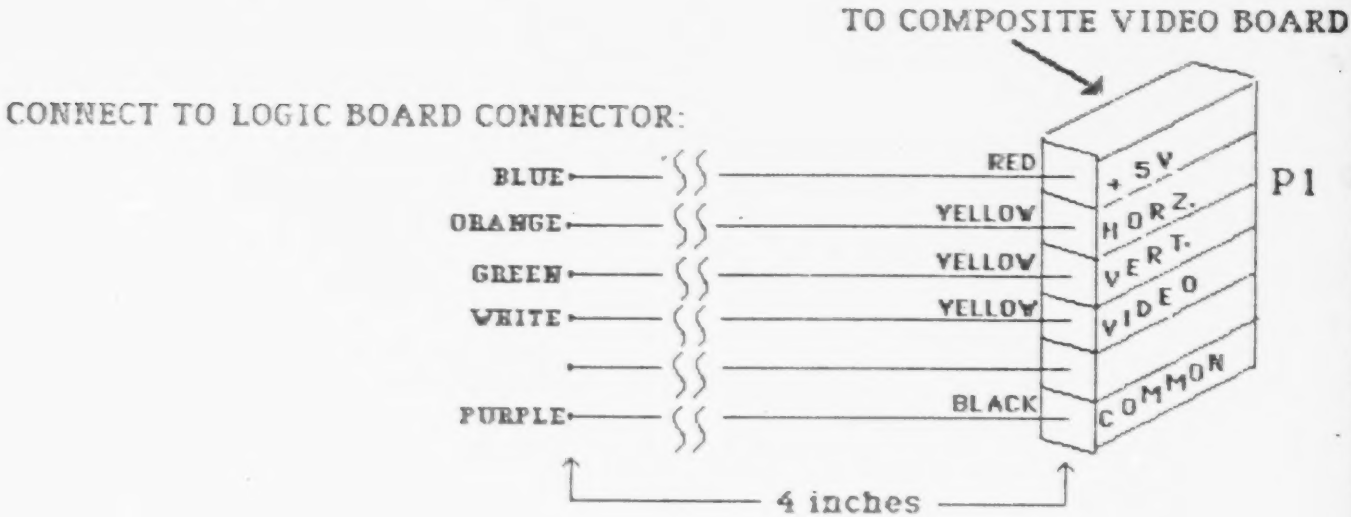
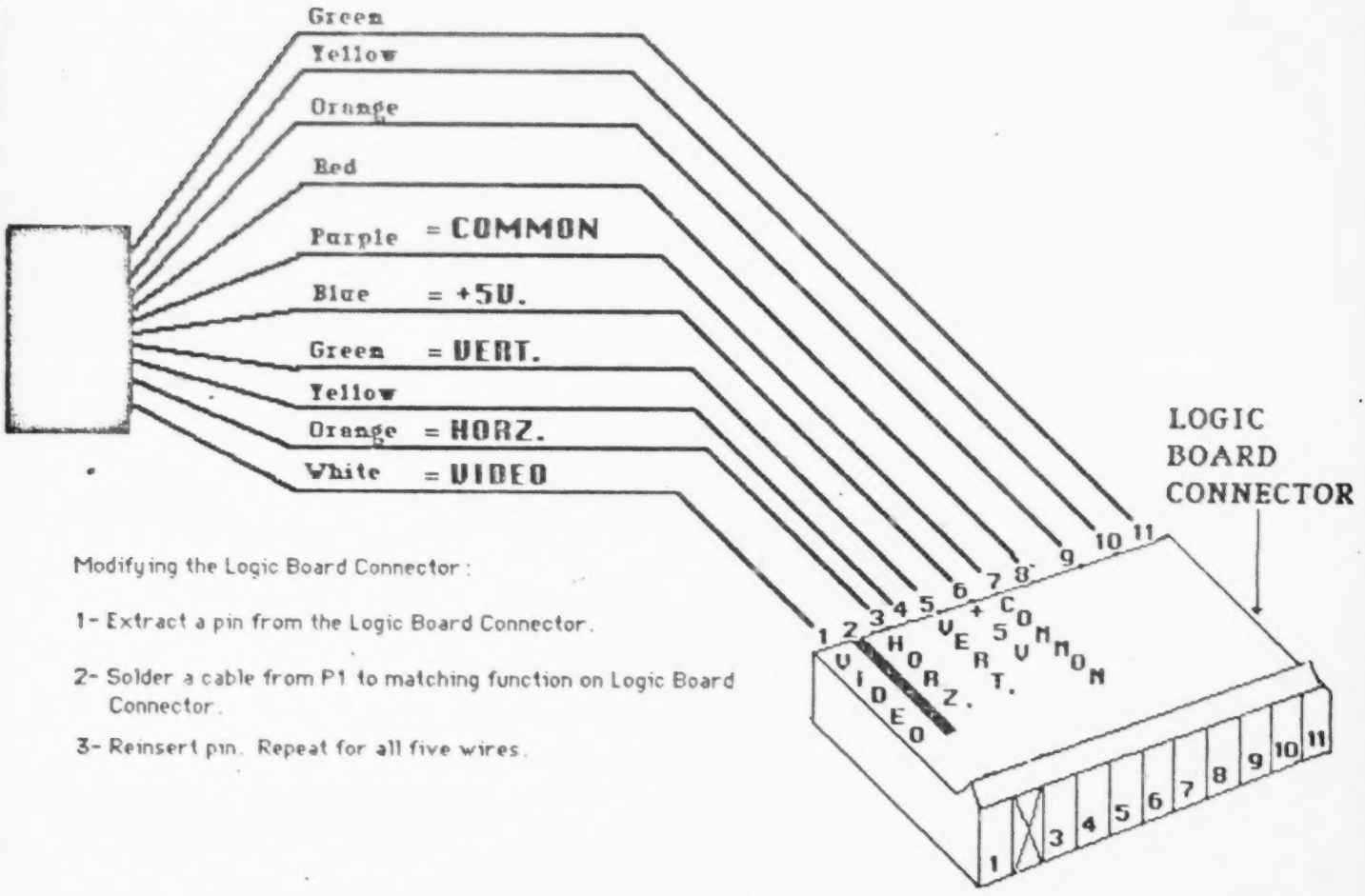
MODIFYING THE POWER SUPPLY TO LOGIC BOARD CABLE





Modifying the Logic Board Connector:

1- Extract a pin from the Logic Board Connector.

2- Solder a cable from P1 to matching function on Logic Board Connector.

3- Reinsert pin. Repeat for all five wires.

VIDEO BOARD PARTS LIST

Resistors

R1	5100Ω
R2	12000Ω
R3	12000Ω
R4	15000Ω
R5	1000Ω
R6	1600Ω
R7	10000Ω
R8	510Ω
R9	1600Ω
R10	120Ω
R11	75Ω

ALL RESISTORS ARE 1/4 WATT, 10%.

Capacitors

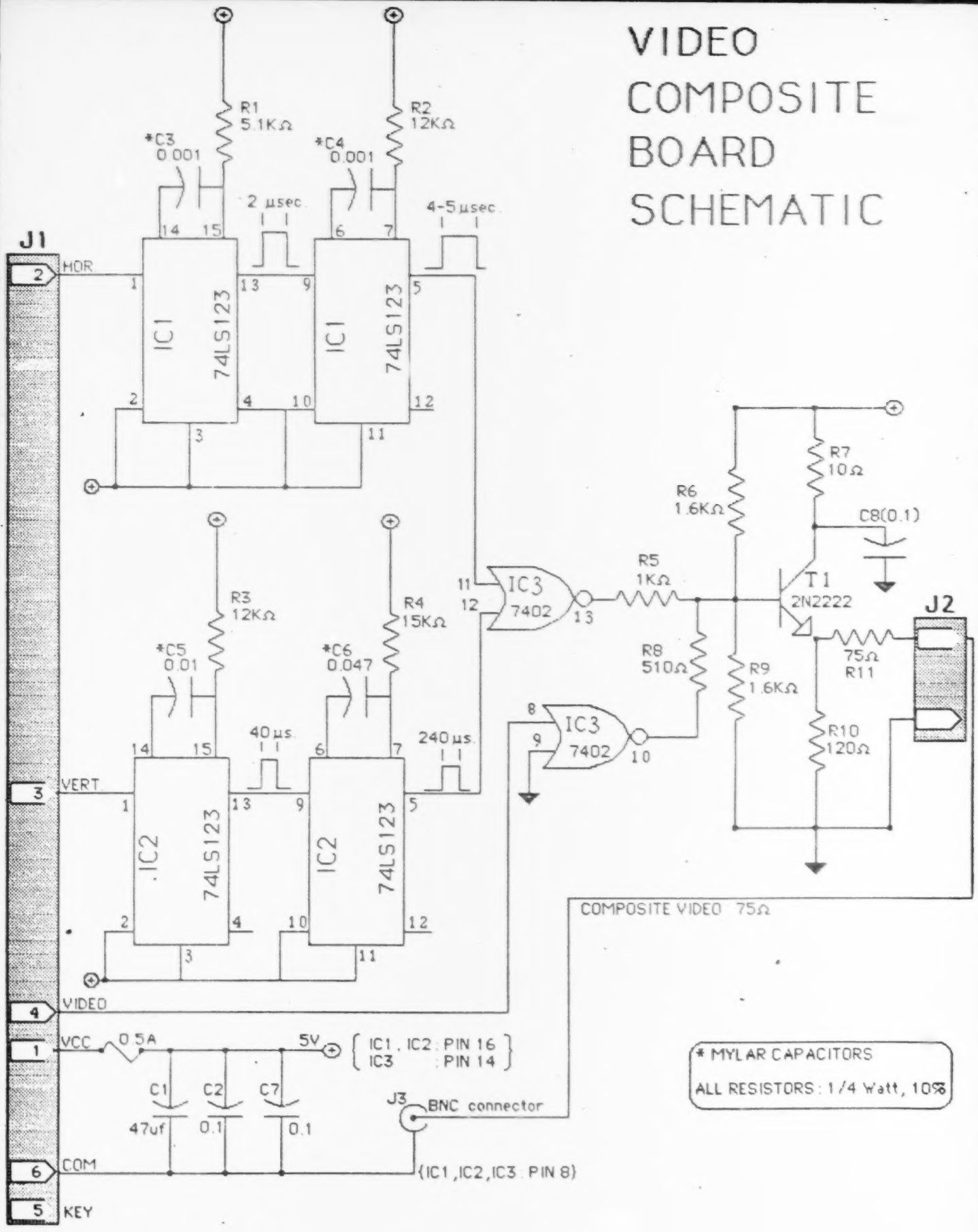
C1	47µf / 25V , electrolytic.
C2	0.1µf , ceramic disk.
C3	0.001µf , mylar.
C4	0.001µf , mylar.
C5	0.01µf , mylar.
C6	0.047µf, mylar.
C7	0.1µf , ceramic disk.
C8	0.1µf , ceramic disk.

Semiconductor & Integrated Circuits

T1	2N2222
IC1	74LS123
IC2	74LS123
IC3	7402

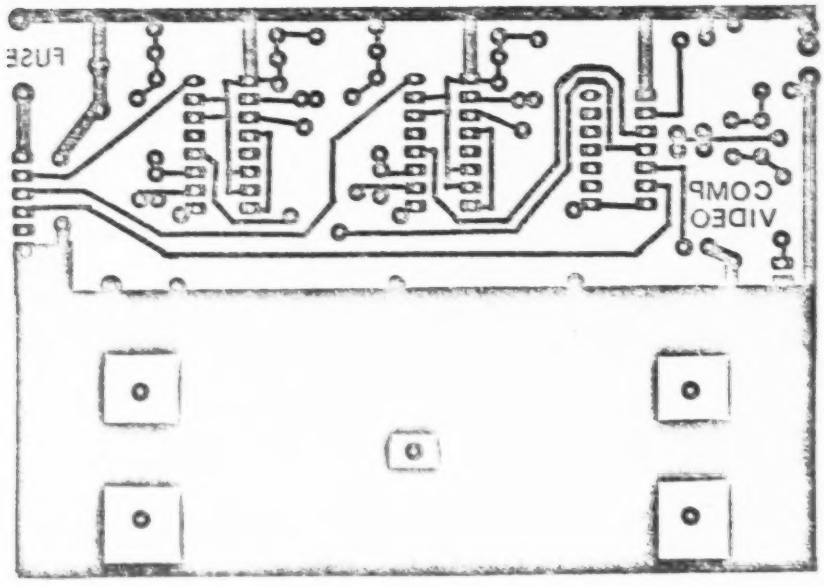
Miscellaneous

J1	6-pin PC wafer , Molex#22-23-2061.
J2	2-pin " " " (cut 6-pin to 2-pin).
J3	BNC panel mount connector, Amphenol #31-236.
P1	6-pin PC connector , Molex #22-01-2067.
P2	2-pin " " " (cut 6-pin to 2-pin).
F1	Pico Fuse 0.5A , 255 series.

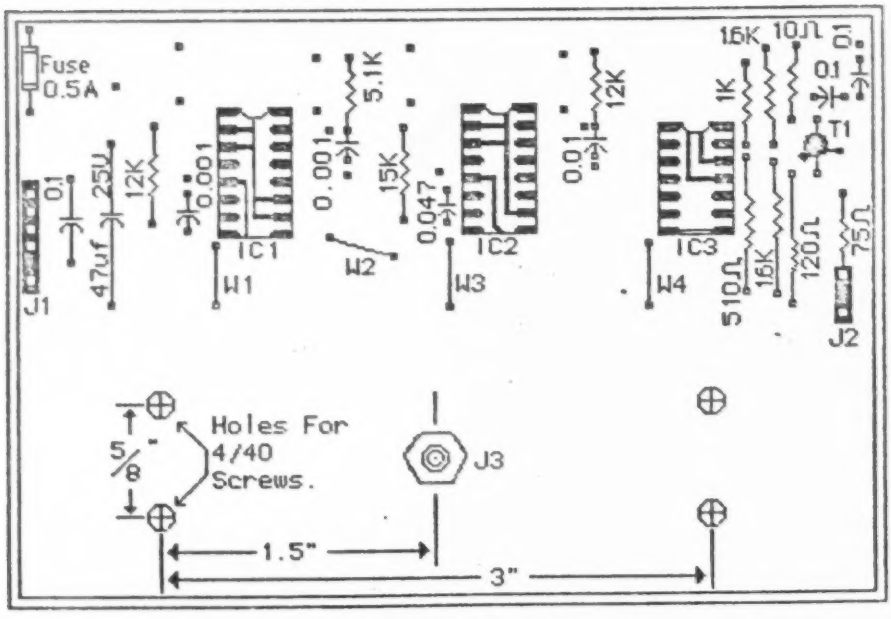

VIDEO
COMPOSITE
BOARD
SCHEMATIC
J1
HOR
VERT
VIDEO
VCC
0.5A
5V
COM
KEY
R1
5.1KΩ
R2
12KΩ
*C3
0.001
*C4
0.001
2 µsec
4-5µsec
IC1
74LS123
R3
12KΩ
R4
15KΩ
*C5
0.01
*C6
0.047
40µs
240µs
IC2
74LS123
IC3
7402
R5
1KΩ
R6
1.6KΩ
R7
10Ω
C8(0.1)
T1
2N2222
R8
510Ω
R9
1.6KΩ
R10
120Ω
75Ω
R11
J2
COMPOSITE VIDEO 75Ω
{IC1, IC2: PIN 16
IC3 : PIN 14}
C1
47uf
C2
0.1
C7
0.1
J3
BNC connector
{IC1, IC2, IC3: PIN 8}
* MYLAR CAPACITORS
ALL RESISTORS: 1/4 Watt, 10%

VIDEO BOARD COMPONENT PICTORIAL

VIEW FROM THE COMPONENT SIDE



VIEW FROM THE COMPONENT SIDE



(PLEASE NOTE WIRE JUMPERS W1 - W4)

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